CALIFORNIA DIVISION OF MINES AND GEOLOGY

SUPPLEMENT NO. 1 TO FER-172

Newport-Inglewood fault zone across southwest Newport Mesa, Orange County

by

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INTRODUCTION

Traces of the Newport-Inglewood fault zone across southwest Newport Mesa were recommended for zoning for special studies, based on fault evaluations detailed in FER-172 (Bryant, 1985) (figure 1). Evidence of possible historical surface fault rupture associated with the 1933 Long Beach earthquake presented by Guptill and Heath (1981) was the primary basis for zoning faults across Newport Mesa. However, there was a paucity of well-defined geomorphic evidence of recent faulting across the mesa, based on interpretation of 1927 aerial photographs by this writer. If not for the data presented by Guptill and Heath (1981), the criteria of "sufficiently active" and "well-defined" would not have been met and zoning would not have been recommended across Newport Mesa. New data have been developed since FER-172 was prepared and are presented in this supplement.

SUMMARY OF NEW DATA

A detailed fault investigation was conducted along the southwestern Newport Mesa by Earth Technology for West Newport Oil Company during April and May 1986. Approximately 3,400 feet of trenches were excavated in order to further delineate stratigraphy, soil profile development, and to evaluate recency of faulting on the West Newport Oil Company property. Paul Guptill was the principal investigator for Earth Technology and was assisted by Marc Egli (Earth Technology) and W. Casey Armstrong (West Newport Oil Company). R. Shelmon provided preliminary interpretations regarding the age of soils. Selected trenches and exposures were inspected by CDMG staff (W. Bryant, R. Miller, D. Saul, S. Tan, J. Treiman,) on June 3, 1986.

Two distinct terrace surfaces were identified on the mesa. A marine platform, correlated with a high stand of sea level about 120,000ybp (oxygen isotope stage 5e) was cut into an older terrace deposit tentatively correlated with oxygen isotope stage 7. Soils on the stage 5e terrace deposits are strongly developed, are up to 10 feet thick, and are estimated to be approximately 100,000 years in age.

Preliminary results of the fault investigation for West Newport Oil Company indicate that the principal trace of the Newport-Inglewood fault zone

does not cross Newport Mesa. However, relatively minor normal faults were reported, generally with vertical displacements ranging from less than an inch to about 4 feet. Holocene displacement along these faults was not demonstrated because none of the faults seem to offset the uppermost soil units. Oil field interpretations by West Newport Oil Company indicate that significant normal faulting occurs in the subsurface southwest of Newport Mesa (figure 1). Guptill (p.c., June 1986) suggested that the principal trace of the Newport-Inglewood fault changes to a more southerly trend west of Newport Mesa. This southerly trend would produce a significant extensional component of displacement and may cause the relatively minor, discontinuous normal faults across the mesa.

Trench T-86-19A was excavated about 50 feet northwest of the bluff face where Guptill and Heath (1981) reported evidence of historical offset (figures 1, 3). The base of a well-developed B soil horizon was offset along fault 5 (figure 3), but faulting could not be demonstrated in the upper part of this B soil horizon. There appeared to be two distinct subunits within the B soil horizon: a horizon characterized by 7.5 YR color and columnar to prismatic ped structures and an overlying horizon characterized by 10 YR color and coarse, blocky ped structures (figure 3). The top of the upper soil horizon above the 10 YR unit had been removed by grading, so it was not possible to unequivocally demonstrate that faulting had not occurred in the upper soil horizon. However, it does seem that Holocene faulting was not demonstrated, and evidence for historical offset along this fault segment could not be verified. (The bluff exposure originally described by Guptill and Heath (1981) has since been extensively modified and verification of the original observations made by Guptill and Heath was not possible).

A more complete soil section was preserved at trench site T-86-17 (figures 1,4), which is adjacent to the "horst block" site reported by Guptill and Heath 1981. A fault offsets terrace deposits (stage 5e) about 42 inches, down to the southwest (figure 4). The base of the B soil horizon is offset, but the fault could not be traced up into an overlying subunit within the B soil horizon. The top of the B soil horizon was not offset and an overlying deposit was not faulted.

Trenches T-86-7, 8, 9, and 10 crossed the approximately located fault zoned for special studies (figure 1). This fault was postulated based on the presence of a broad linear swale (Bryant, 1985). No evidence of faulting was observed in these trenches, except for a minor fault with about 4 inches of vertical displacement in T-86-9 (figure 2). The B soil horizon was not clearly displaced along this fault, which is located about 250 feet northeast of Bryant's postulated trace.

Farther northwest, a zone of normal faulting about 300 feet wide observed by this writer in September 1985 was used locally to infer the location of the zoned fault projected across Newport Mesa (figure 1). Vertical displacements in the terrace deposits ranged from a few inches to about 3 feet. The base of a B soil horizon was offset about 6 inches along a northwest-trending, 37° NE-dipping minor branch fault within this zone. The upper part of the soil horizon had been removed by grading and no clear evidence of faulting in the upper part of the existing soil horizon was observed at that location (W.C. Armstrong, p.c. June 1986).

CONCLUSIONS

The segment of the Newport-Inglewood fault zone across the southwestern portion of Newport Mesa was recommended for zoning for special studies based largely on reported historical surface fault rupture, possibly associated with the 1933 Long Beach earthquake (Guptill and Heath, 1981) (figure 1). Geomorphic evidence of recent faulting across this part of the Newport Mesa was very weak and permissive of only minor or distributive active faulting. Zoning would not have been recommended if not for Guptill and Heath's data.

A fault investigation by Earth Technology found no evidence of Holocene displacement along the faults originally recommended for zoning (Bryant, 1985). The reported historical offset could not be verified, and a trench excavated 50 feet northwest along the trend of Guptill and Heath's feature showed no evidence of Holocene displacement (figures 1, 3). A satisfactory interpretation for the offset fill is difficult to reconcile with the additional data developed by Earth Technology. It seems that historical offset associated with the 1933 earthquake is not verified by the new data and must be seriously questioned. Based on new data presented by Earthquake Technology, it is concluded that the fault recommended for zoning across Newport Mesa does not meet the criteria of "sufficiently active" and " well defined" (Hart, 1985).

RECOMMENDATIONS

Traces of the Newport-Inglewood fault zone across Newport Mesa, recommended for zoning for special studies in FER-172, do not meet the criteria for zoning. These traces and the zone shown on the Newport Beach Preliminary SSZ Map of January 1, 1986 should not be shown on the Official Map to be issued July 1, 1986.

I concur with the recommendations.
Earl W. Hart
6/20/86

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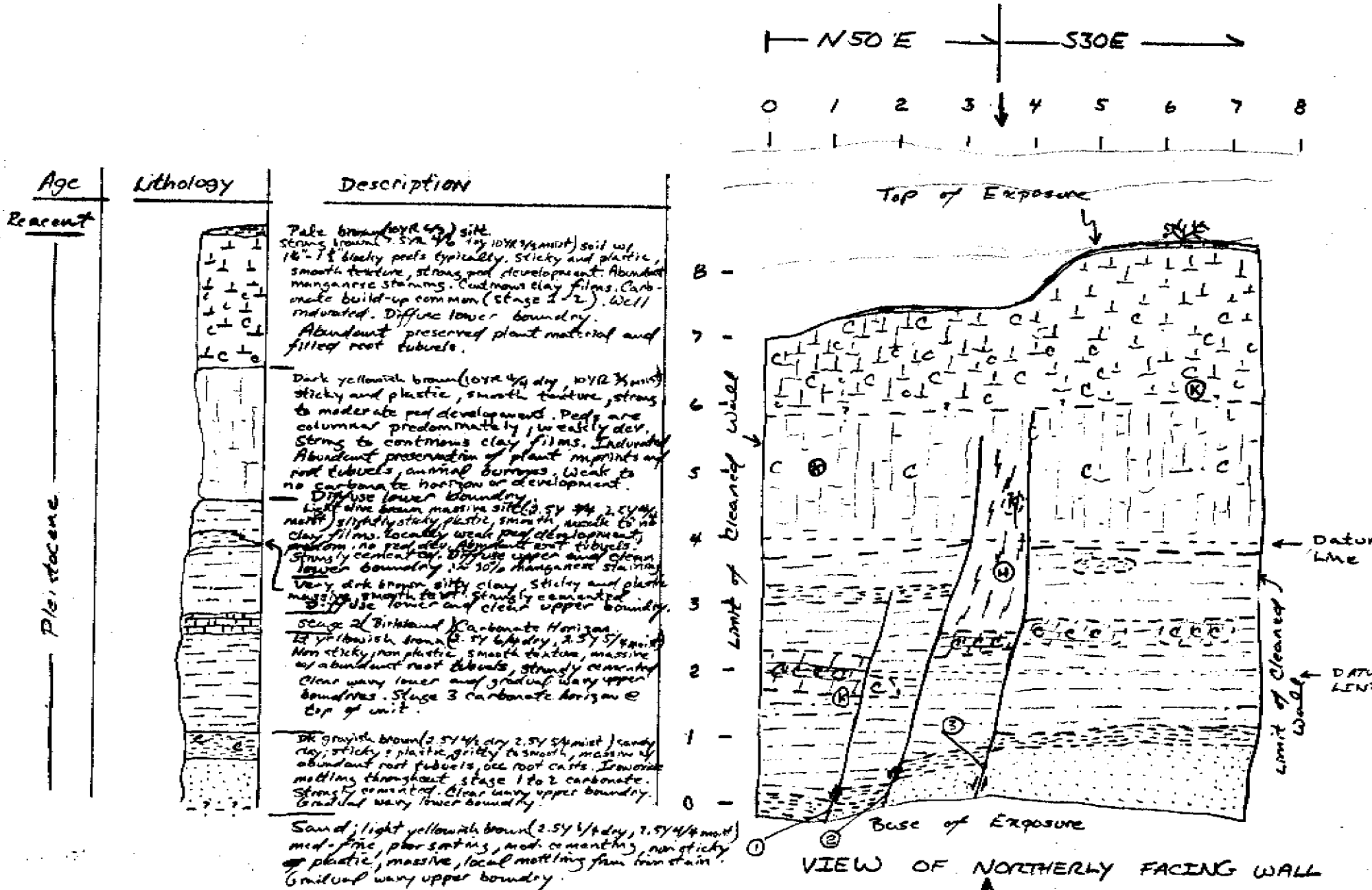
June 17, 1986

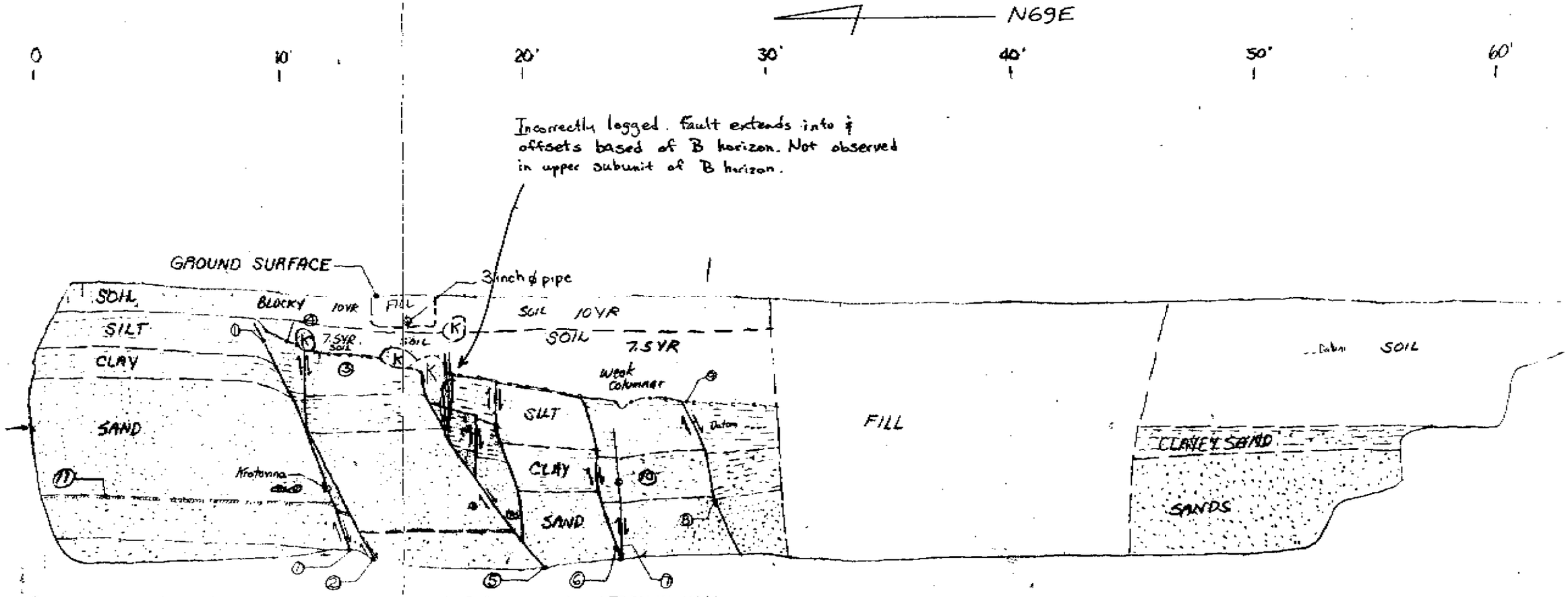
REFERENCES

Bryant, W.A., 1985, Southern Newport-Inglewood fault zone, southern Los Angeles and northern Orange Counties: California Division of Mines and Geology Fault Evaluation Report FER-172, 21 p.

Guptill, P.D. and Heath, E.G., 1981, Surface faulting aldong the Newport-Inglewood zone of deformation: California Geology, v. 34, no. 7, p. 142-148.

Hart, E.W., 1985, Fault-rupture hazard zones in California: California Division of Mines and Geology Special Publication 42, 24 p.


N50E
S30E
0 1 2 3 4 5 6 7 8
Top of Exposure
Limit of cleaned wall
Datum #1 LME
Datum #2 LINE
Base of Exposure
Age
Lithology
Description
Recent
Pleistocene
Pale brown (10YR 6/3) silt
Dark yellowish brown (10YR 4/4 dry, 10YR 3/4 moist)
Diffuse lower boundary
Very dark brown, silty clay
Stage 2 Birkeland Carbonate Horizon
Dk grayish brown (2.5Y 4/2 dry 2.5Y 5/4 moist)
Sand; light yellowish brown (2.5Y 6/4 dry, 2.5Y 4/4 moist)
1 FAULT : Apparent dip slip of 3", down to SW
2 FAULT : Apparent dip slip of 4", down to SW
3 FAULT: Apparent dip slip of 3", down to SW.
4 Zone of shearing (diffuse)
VIEW OF NORTHERLY FACING WALL
90° Bend in Exposure
1 inch = 2 feet
Fig. 4 (supplement to FEB-172
West Newport Oil
T-86-17A
Log of Exposure
Logged by C. Armstrong
5-28-86



VIEW OF SOUTHERN TRENCH WALL

① FAULT; N20°W 64°SW

② FAULT; N36W 68SW

③ SILTS show pronounced pedogenic features (red brown color, wk ped development, clay films) to a depth of 1 foot below top SILT contact

④ Dark brown SILTY CLAY horizon along base of SOIL HORIZONS.

⑤ FAULT; N30W, 55SW

⑥ FAULT, N12W, 63SW

⑦ FAULT; N15W, 73SW

⑧ FAULT; N20W, 80SW

⑨ Stage III CALICHE HORIZON (lies strat below ③) at base of SOILS. Offset 1/2 foot (dip slip separation)

⑩ CLAY unit becoming noticeably more sandy; CLAYEY SAND.

⑪ Stage II to III CALICHE HORIZON at base of upper SANDS.

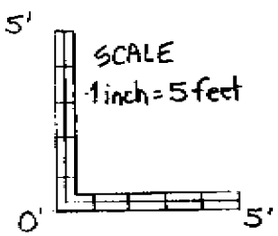


Figure 3 (supplement to FER-172).

WEST NEWPORT OIL 86-820
LOG OF TRENCH T-86-19
SHEET 1 OF 1
LOGGED BY: M. EGLI, C. ARMSTRONG
DATE: 3 MAY 1986